

# MATRIX® PRO

## ASSISTED/AUTO STEERING SETUP GUIDE

For use with software version 2.0x or 2.5x

**MATRIX® PRO840G**



**MATRIX® PRO570G**



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## Safety Information

TeeJet Technologies is not responsible for damage or physical harm caused by failure to adhere to the following safety requirements.

As the operator of the vehicle, you are responsible for its safe operation.

Assisted/Auto Steering is not designed to replace the vehicle's operator.

Do not leave a vehicle while the Assisted/Auto Steering is engaged.

Be sure that the area around the vehicle is clear of people and obstacles before and during engagement.

The Assisted/Auto Steering is designed to support and improve efficiency while working in the field. The driver has full responsibility for the quality and work related results.

Disengage Assisted/Auto Steering before operating on public roads or when not in use to prevent loss of vehicle control.



**WARNING: PINCH POINT HAZARD!** To prevent serious injury or death, avoid unsafe practice while manually operating hydraulic steering circuits. Keep others away and stay clear of mechanical steering linkages.

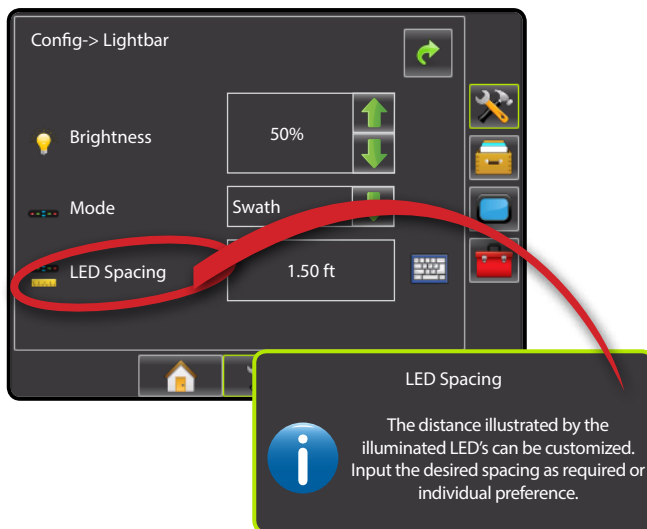
## GENERAL MATRIX® PRO INFORMATION

The Matrix Pro is used to configure the vehicle and its implements including auto steering and tilt.

### Setup Option Information

Press the option's icon or option's name of any menu item to display a definition and range values of that item. To remove the information box, press anywhere on the screen.

Figure 1: Example of Information Text Box



### Drop Down Menu Selections




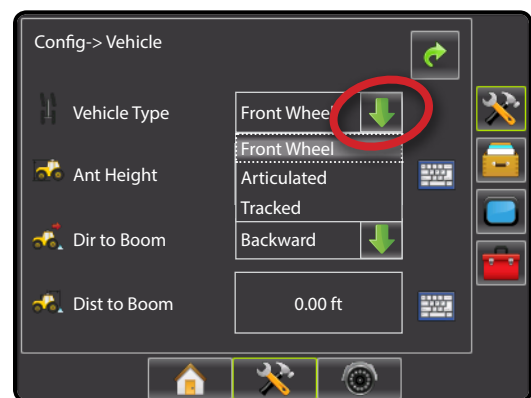
Press DOWN arrow  to access the list of options. Use the UP/ DOWN arrows   or slide bar if necessary to scroll through the extended list. Select the appropriate option. To close the list without selecting an option, press anywhere on the screen outside the drop down menu.

Figure 2: Example of Drop Down Menu



# Assisted/Auto Steering

## Keyboard Entry Screen




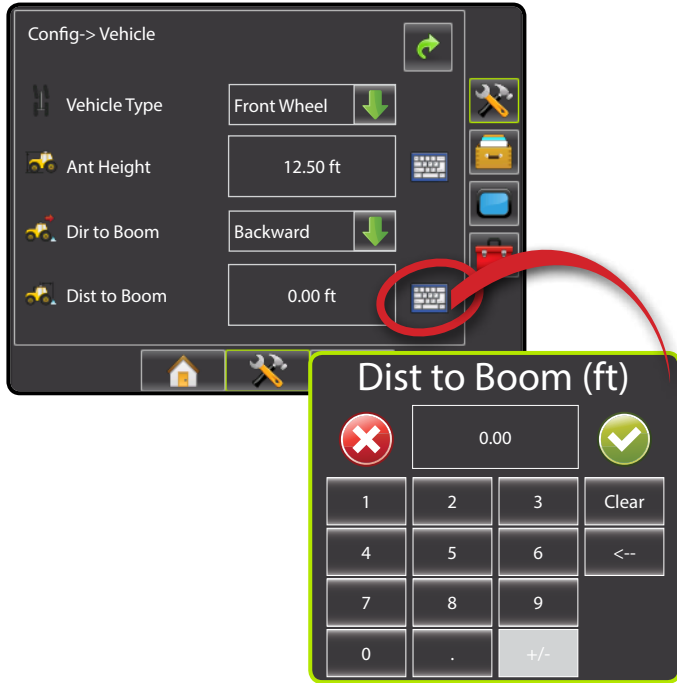
Press the KEYPAD icon  to use a numeric keypad to enter a value. Press **Clear** to erase the existing value. Press the ACCEPT icon  to save the settings or the CANCEL icon  to leave the keypad without saving.

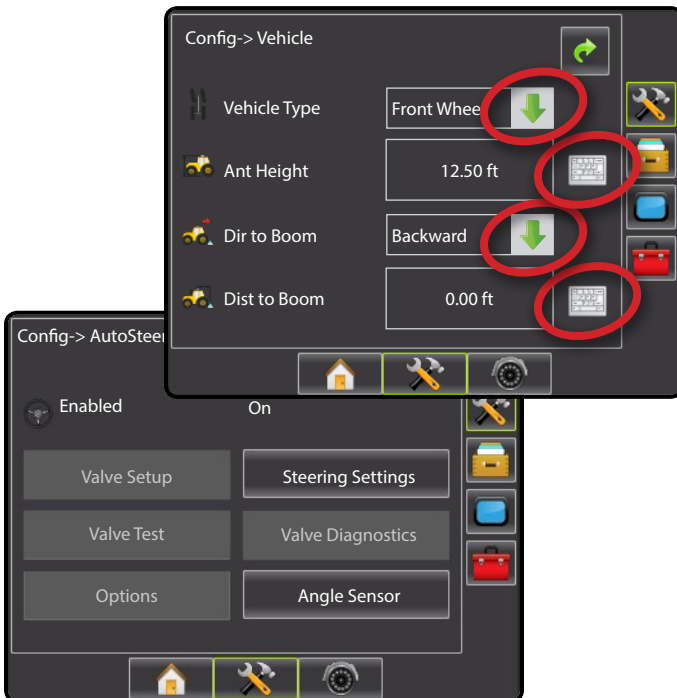
Figure 3: Example of Keyboard



























## Unavailable Options When Job is Active

When a job is active some setup options are unavailable. See the Unit Setup Mode Availability Chart for indication of which options are not accessible.

Figure 4: Example of Unavailable Options



## Unit Setup Mode Availability

Vehicle	-	 Vehicle Type	✗		
	-	 Antenna Height	✗		
	-	 Direction to Boom	✗		
	-	 Distance to Boom	✗		
Implement	-	 Number of Sections	✗		
	-	 Guidance Width	✗		
	-	 Spray Width	✗		
	-	 Overlap	✓		
	-	 Delay On	✓		
	-	 Delay Off	✓		
AutoSteer	-	 Enable	✓		
	Valve Setup	-	 Valve Type	✗	
		-	 Frequency	✗	
		-	 Minimum Duty Cycle Left	✗	
		-	 Minimum Duty Cycle Right	✗	
		-	 Maximum Duty Cycle	✗	
	Steering Settings	-	 Coarse Adjustment	✓	
		-	 Deadband	✓	
		-	 Fine Adjustment	✓	
		-	 Lookahead	✓	
	-	Valve Test	✗		
	-	Valve Diagnostics	✗		
	-	Options	-	 Steering Wheel Sensor	✗
	Steering Angle Sensor	-	Enable	✓	
-		Calibrate Sensor	✓		
-		Offset Adjustment	✓		
Tilt	-	Enabled	✓		
	-	Field Level	✓		
GPS	-	 GPS Type	✗		
	-	 GPS Port	✗		
	-	 GPS Status	✓		

✓ Available during an active job

✗ Not Available during an active job

## GPS IS REQUIRED

GPS is used to configure GPS Type and GPS Port.

*NOTE: These settings are required for assisted/auto steering and tilt sensor operation, as well as proper implement operation.*







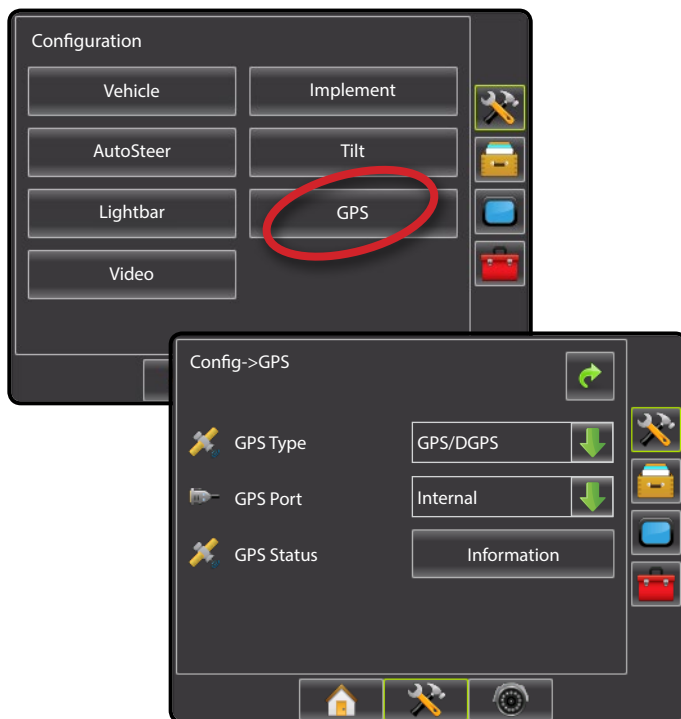
1. Press CONFIGURATION side tab .
2. Press **GPS**.
3. Select from:
  - ▶ GPS Type  – select GPS source transmissions
  - ▶ GPS Port  – sets (D)GPS COM port
  - ▶ GPS Status  – displays information for TeeJet Customer Service use on GGA/VTG (Data Rates), Number of Satellites, HDOP, PRN, GGA Quality, GPS Receiver and Receiver Version.
4. Press RETURN arrow  or CONFIGURATION side tab  to return to the main Configuration screen.

Figure 5: GPS



### GPS Type

GPS Type customizes the system to accept GPS source or DGPS source transmissions.


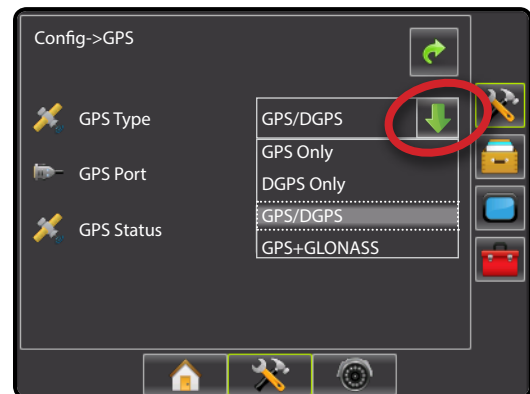

1. Press DOWN arrow  to access the list of options.
2. Select:
  - ▶ GPS Only – uncorrected signals
  - ▶ DGPS Only – differentially corrected signals
  - ▶ GPS/DGPS – either type of signal
  - ▶ GPS+GLONASS – uncorrected signals from both the GPS and GLONASS systems

Figure 6: GPS Type



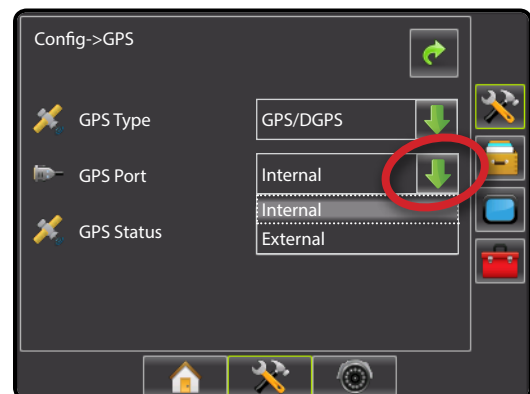
### GPS Port

GPS Port sets port transmission to Internal or External.

1. Press DOWN arrow  to access the list of options.
2. Select:
  - ▶ Internal – use the internal (D)GPS (if equipped) and transmit out
  - ▶ External – receive external (D)GPS data

*NOTE: Working with GPS signals such as Omnistar HP/XP or RTK will require GPS port to be set to External.*

Figure 7: GPS Port



# Assisted/Auto Steering

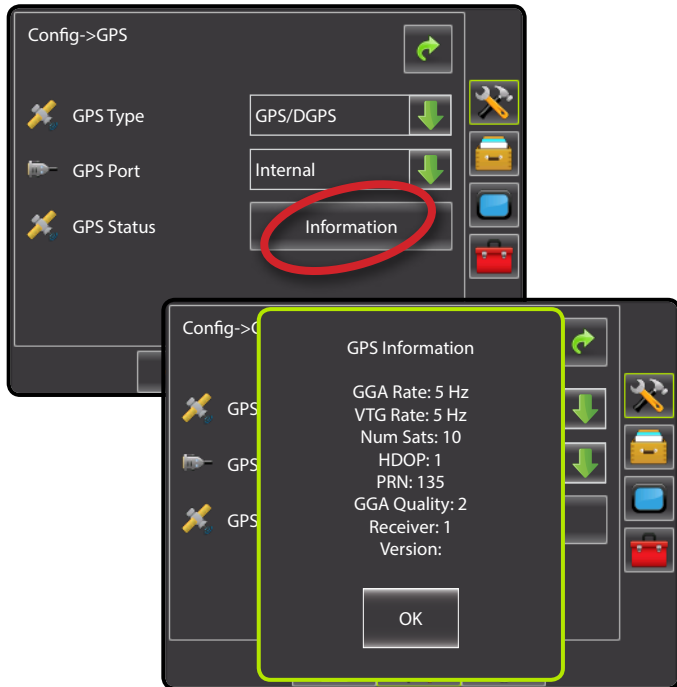
## GPS Status

GPS Status displays information regarding data rates, number of satellites in view, and satellite quality and ID.

1. Press **Information**.
2. View data including:
  - ◀ GGA/VTG (Data Rates) – the number of GPS positions per second.
  - ◀ Num Sats – the number of GPS satellites in view (minimum of 4 are required for DGPS)
  - ◀ HDOP – a measure of satellite geometry strength in the horizontal plane. A HDOP value of less than 2 is preferred.
  - ◀ PRN – the current DGPS satellite ID
  - ◀ GGA Quality – the current quality indicator of the GPS signal (see GGA chart)
  - ◀ Receiver – the current indicator of the receiver
  - ◀ Version – the software version installed on the receiver
3. Press **OK** to return to GPS setup screen

*NOTE: If GPS is not available, all entries will be "Invalid"*

Figure 8: GPS Status



## External Receiver Minimum Configuration Requirements

Before the Matrix will connect and work with an external GPS receiver, these minimum configuration requirements must be met.

Serial Port Settings	
Baud rate:	19,200
Data Bits:	8
Parity:	None
Stop Bits:	1

### Serial Port connection requirements

Male 9 pin RS-232 serial cable

*NOTE: May require Null modem adapter depending on pin out of receiver.*

NMEA Strings	
GGA	5 Hz
Optional VTG	5 Hz, 2 Hz, Off
ZDA	0.2 Hz

## GGA Requirements

GGA Quality required to be able to work with various types of signal can vary. See table below for requirements.

Service	Indicator	Accuracy
GPS only	1	<3 m
WAAS/EGNOS/Beacon	2	<1 m
RTK	4	4 cm
Omnistar HP/XP	5	10 cm
Glide/ClearPath	9	<1 m

## ASSISTED/AUTO STEERING CONFIGURATION

The Matrix Pro is used to configure the vehicle and its implements including assisted/auto steering and tilt. For recommendations and factory settings for the FieldPilot or UniPilot setup values, see chart on page 19.

To access Matrix Pro AutoSteer and Tilt configuration options:



1. Press UNIT SETUP bottom tab .
2. Press CONFIGURATION side tab .
3. Select from:
  - ▶ AutoSteer – used to enable/disable assisted/auto steering as well as establish valve setup settings, steering settings and steering angle sensor settings; and perform valve tests and valve diagnostics.
  - ▶ Tilt – used to enable/disable and calibrate the tilt function, allowing for tilt correction for application on hilly or sloped terrain.

Figure 9: Configuration Options



### AutoSteer

When a Steering Control Module (SCM) is present, Assisted/Auto Steering options will be available

*NOTE: An update of your SCM software will also be required when updating an existing Matrix console to Matrix Pro.*

AutoSteer setup is used to Enable/Disable Assisted/Auto Steering and configure Valve Setup, Steering Settings, Valve Test, Valve Diagnostics and Angle Sensor. For recommendations and factory settings for the FieldPilot or UniPilot setup values, see chart on page 19.




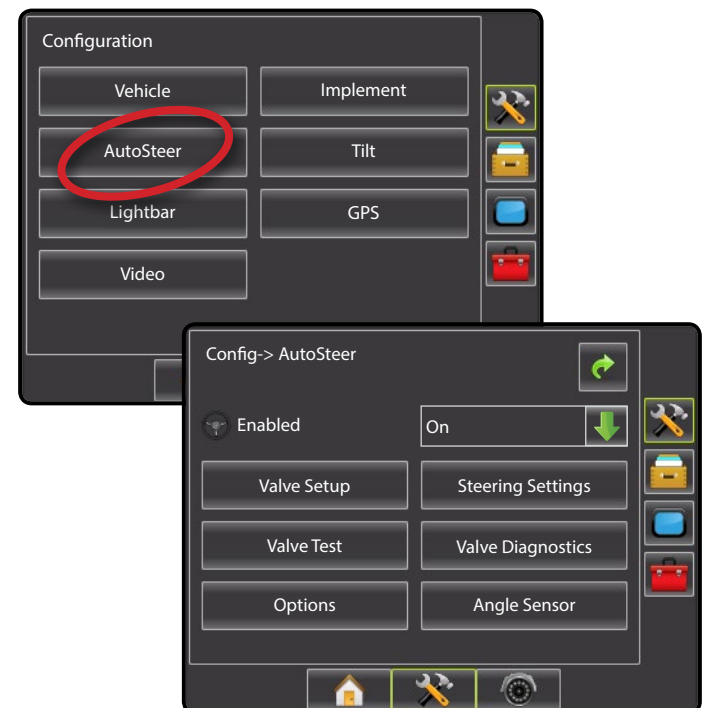
1. Press CONFIGURATION side tab .
2. Press **AutoSteer**.
3. Select if auto steering is
  - ▶ On – enabled
  - ▶ Off – disabled.
4. Select from:
  - ▶ Valve Setup – used to configure Valve Type, Valve Frequency, Minimum Duty Cycle Left, Minimum Duty Cycle Right and Maximum Duty Cycle
  - ▶ Steering Settings – used to establish Coarse Adjustment, Fine Adjustment, Deadband and Lookahead
  - ▶ Valve Test – used to verify if steering is directed correctly
  - ▶ Valve Diagnostics – used to test the valves to see if they are connected properly
  - ▶ Options: Steering Wheel Sensor – used to select whether the sensor is magnetic or pressure based
  - ▶ Angle Sensor – used to establish the Steering Angle Sensor (SAS) as the primary feedback sensor for auto steering, calibrate the SAS and set an offset adjustment.
5. Press RETURN arrow  or CONFIGURATION side tab  to return to the main Configuration screen.

Figure 10: AutoSteer

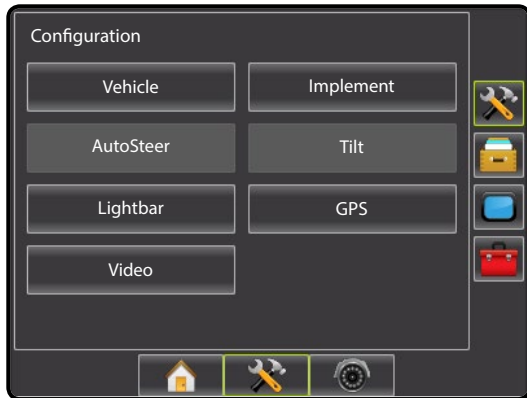


# Assisted/Auto Steering

## Assisted/Auto Steering Unavailable


If a assisted/auto steering system is not installed, calibration options will not be available.

Figure 11: Assisted/Auto Steering Not Detected



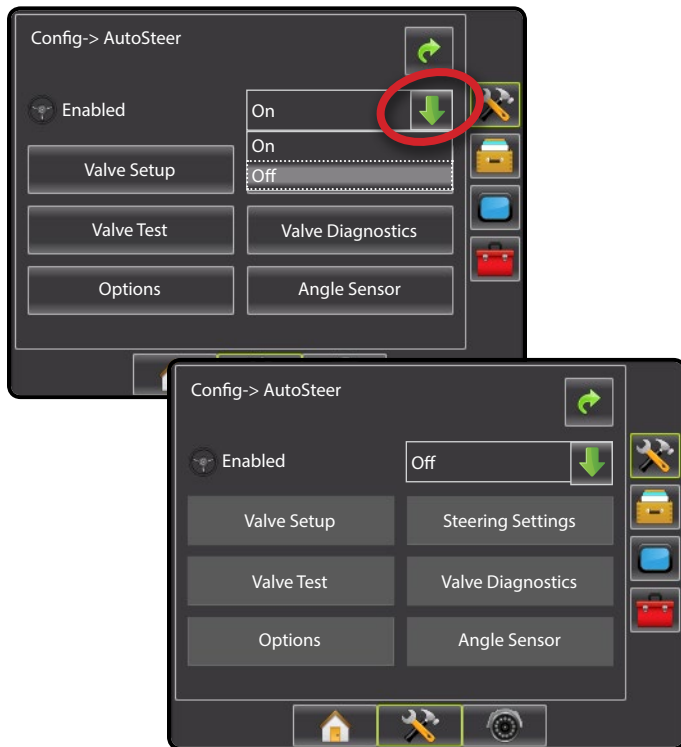
## Enable/Disable Assisted/Auto Steering

Set assisted/auto steering to On or Off.

1. Press DOWN arrow  to access the list of options.
2. Select:
  - ▶ On
  - ▶ Off

If Enabled is set to "Off", all Assisted/Auto Steering capabilities and setup functions will be disabled (options will be grayed out).

Figure 12: Enabled and Disabled Assisted/Auto Steering Options



## Valve Setup

Valve Setup is used to configure Valve Type, Valve Frequency, Minimum Duty Cycle Left, Minimum Duty Cycle Right and Maximum Duty Cycle. For recommendations and factory settings for the FieldPilot or UniPilot setup values, see chart on page 19.






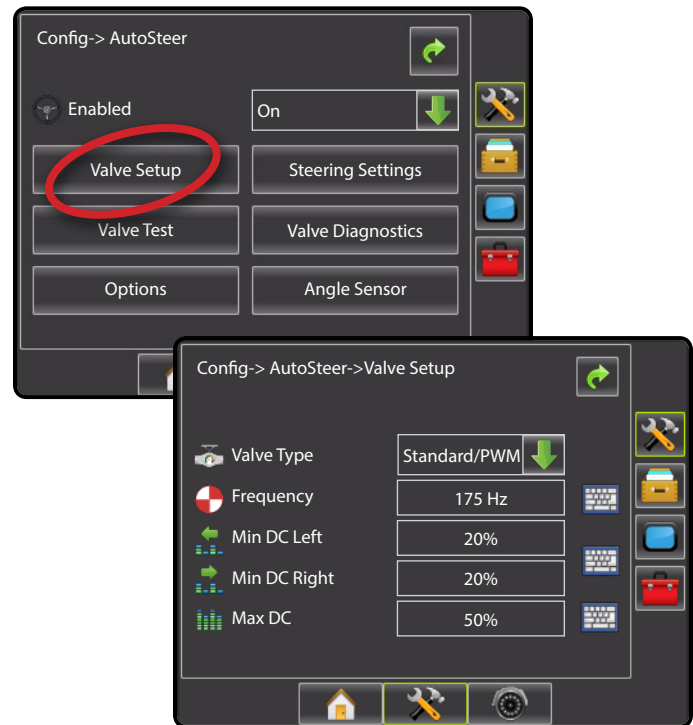
1. Select **Valve Setup**.
2. Select from:
  - ▶ Valve Type  – used to select the type of steering valve
  - ▶ Frequency  – used to select the valve frequency used to drive the steering valve
  - ▶ Minimum Duty Cycle Left and Right   – used to set the minimum amount of drive required to begin steering the vehicle left or right
  - ▶ Maximum Duty Cycle  – used to select the maximum speed that the wheels will steer from lock to lock

Figure 13: Valve Setup





## Valve Type

Valve type is used to set the type of steering valve. For recommendations and factory settings for the FieldPilot or UniPilot setup values, see chart on page 19.


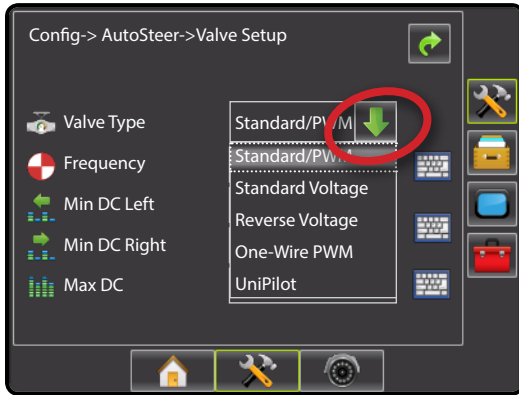
1. Press DOWN arrow  to access the list of options.
2. Select type.

Figure 14: Valve Type



## Valve Frequency

Valve frequency is used to drive the steering valve. The type of valve being used determines the frequency. Range is 0.9 - 15000.1. For recommendations and factory settings for the FieldPilot or UniPilot setup values, see chart on page 19.


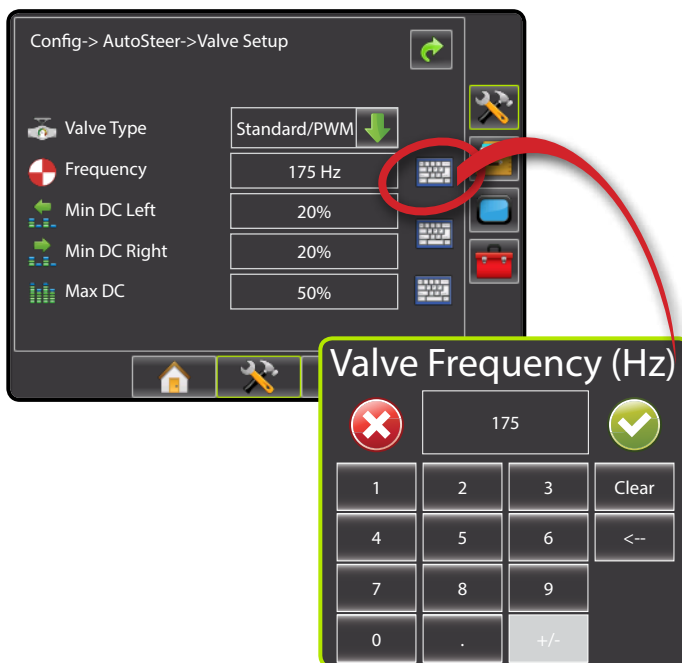
1. Press the KEYPAD icon .
2. Use the entry screen to establish the valve frequency.

Figure 15: Valve Frequency



## Minimum/Maximum Duty Cycle Tests

Minimum Duty Cycle (Minimum DC Left + Right) sets the minimum amount of drive required to begin steering the vehicle left or right. Range is 0.0 - 50.0. Default is 20%.

Maximum Duty Cycle sets the maximum speed that the wheels will steer from left to right / right to left (lock to lock). Range is 25 - 100. Default is 50%.

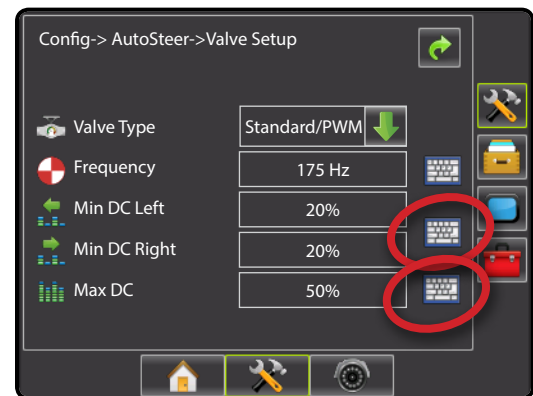
**NOTE:** A GPS signal is required for these tests.

**RECOMMENDATION:** Have a large area of clear space available to perform test cycles. Vehicle speed must be between 1.0 mph and 8.0 mph / 1.5 - 13.0 km/hr (0.4 - 3.6 m/s).

**WARNING: Pinch Point Hazard!**

To prevent serious injury or death, avoid unsafe practice while manually operating hydraulic steering circuits. Keep others away and stay clear of mechanical linkage.

Figure 16: Duty Cycle Tests



# Assisted/Auto Steering

## Minimum Duty Cycle Left Test

Minimum Duty Cycle Left sets the minimum amount of drive required to begin steering the vehicle to the left.

*NOTE: If the valve frequency is set below 15 Hz (non proportional), set the amount of drive to "25.0". Cycle test is not necessary.*



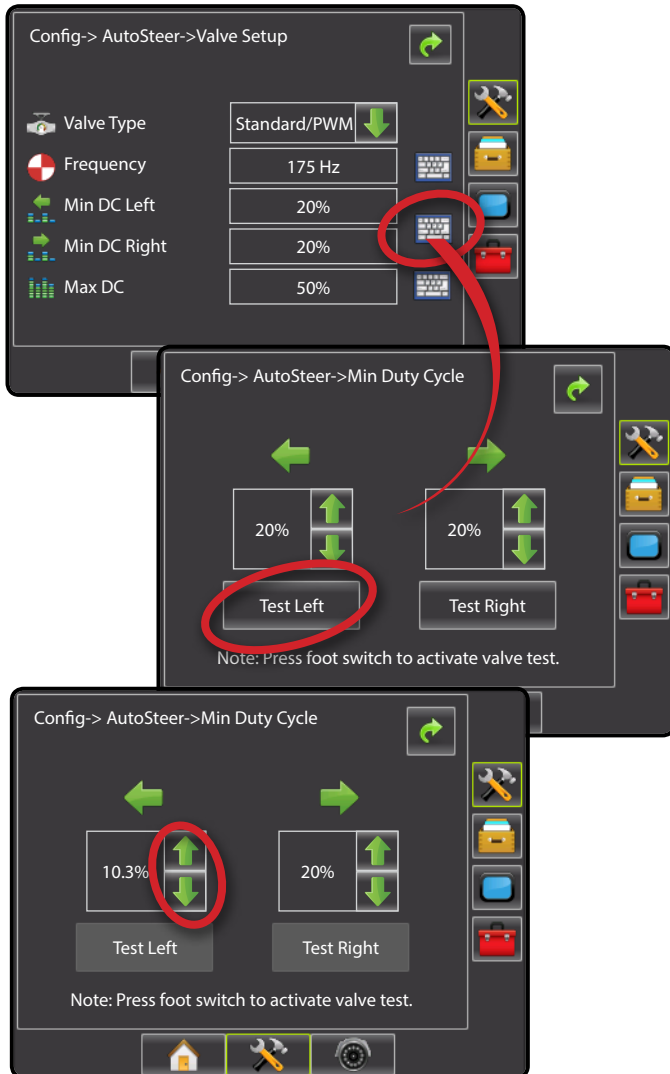
1. Press the KEYPAD icon .
2. While the vehicle is moving in a slow forward straight line motion between 1.0 mph and 8.0 mph / 1.5 - 13.0 km/hr (0.4 - 3.6 m/s), press **Test Left**.
3. Press the engage/disengage switch or foot switch to activate the test.
4. Slowly increase the duty cycle number using the UP arrow  until the vehicle begins to turn left.
5. Turn the steering wheel or press the engage/disengage switch or foot switch to complete the test.

Figure 17: Minimum Duty Cycle Test



## Minimum Duty Cycle Right Test

Minimum Duty Cycle Right sets the minimum amount of drive required to begin steering the vehicle to the right.

*NOTE: If the valve frequency is set below 15 Hz (non proportional), set the amount of drive to "25.0". Cycle test is not necessary.*



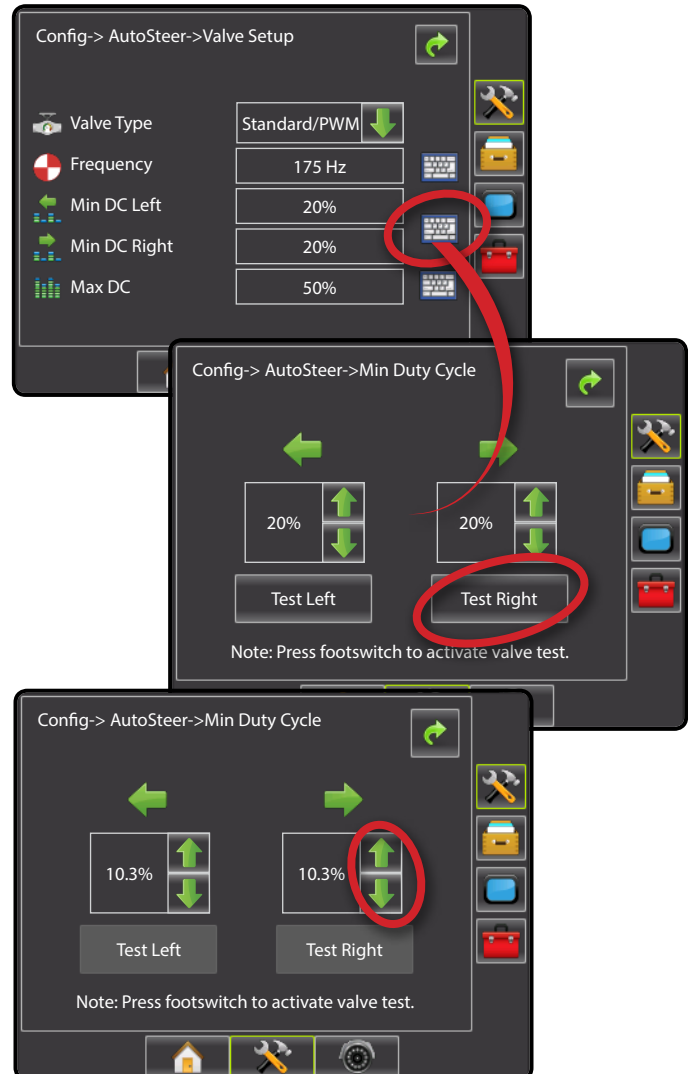
1. Press the KEYPAD icon .
2. While the vehicle is moving in a slow forward straight line motion between 1.0 mph and 8.0 mph / 1.5 - 13.0 km/hr (0.4 - 3.6 m/s), press **Test Right**.
3. Press the engage/disengage switch or foot switch to activate the test.
4. Slowly increase the duty cycle number using the UP arrow  until the vehicle begins to turn right.
5. Turn the steering wheel or press the engage/disengage switch or foot switch to complete the test.




Figure 18: Minimum Duty Cycle Test



## Maximum Duty Cycle Test

Maximum Duty Cycle sets the maximum speed that the wheels will steer from lock to lock. For recommendations and factory settings for the FieldPilot or UniPilot setup values, see chart on page 19.

*NOTE: If the valve frequency is below 15 Hz (non proportional), set the value to 100. Speed will be established during the Valve Test.*

1. Press the KEYPAD icon .
2. While the vehicle is moving in a slow forward motion between 1.0 mph and 8.0 mph / 1.5 - 13.0 km/hr (0.4 - 3.6 m/s), turn the wheels all the way to the left (or right).
3. Press the RIGHT arrow  (or LEFT arrow .
4. Press the engage/disengage switch or foot switch to activate the test. This will start a timer as well as turn the vehicle to the right (or left).
 



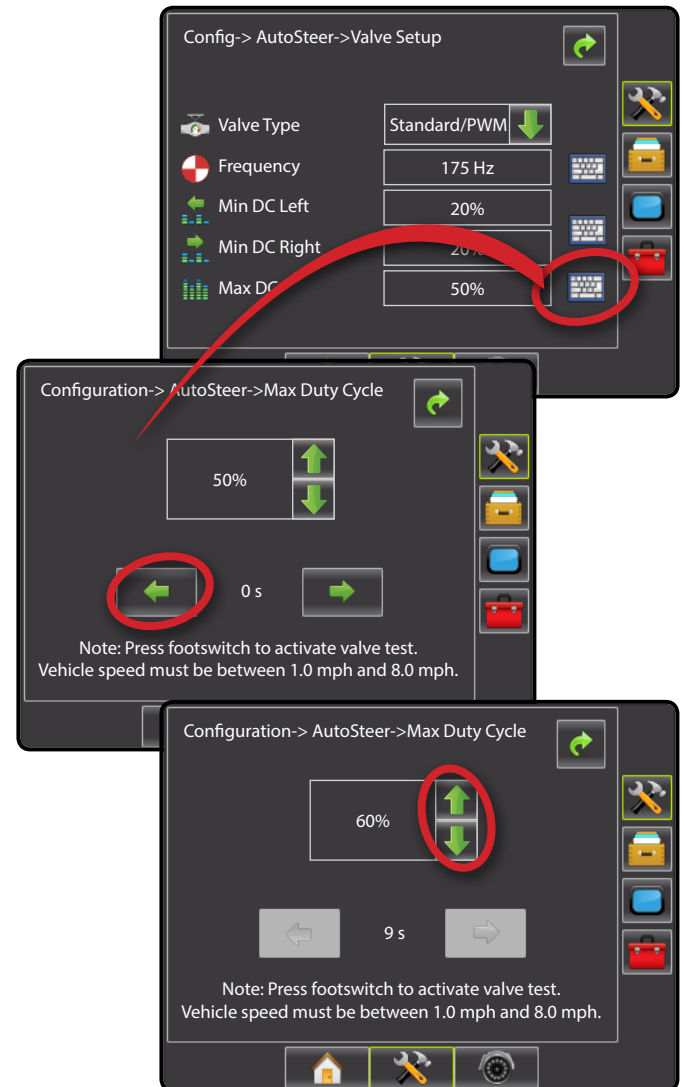
**WARNING!** *When using a UniPilot, the UniPilot will move the steering wheel very quickly. Keep loose clothing, hair and hands away from the steering wheel while performing this test.*
5. When the wheels are all the way to the right (or left), stop the test by pressing the engage/disengage switch or foot switch. The time displayed is the lock to lock time.
6. Repeat to perform procedure to the opposite side.
7. Compare the lock-to-lock time with the recommended time.
8. Press the UP/DOWN arrows   to adjust the value.
  - ▶ Lock-to-lock time is too low (turning too fast) – decrease the value
  - ▶ Lock to lock time is higher (turning too slow) – increase the value
9. Repeat until recommended lock time is achieved.

Figure 19: Maximum Duty Cycle



# Assisted/Auto Steering

## Steering Settings

Steering Settings is used to configure Coarse Adjustment, Fine Adjustment, Deadband and Lookahead settings.

1. Select **Steering Settings**.
2. Select from:
  - ▶ Coarse Adjustment – used to select how aggressively the vehicle maintains a guideline in Straight AB Guidance
  - ▶ Fine Adjustment – used to select how aggressively the vehicle maintains a guideline in Curved AB Guidance
  - ▶ Deadband – used to set if steering is too choppy/ responsive or remains consistently off the guideline
  - ▶ Lookahead – used to select the vehicle's approach to the guideline in Straight AB Guidance mode

Figure 20: Steering Settings

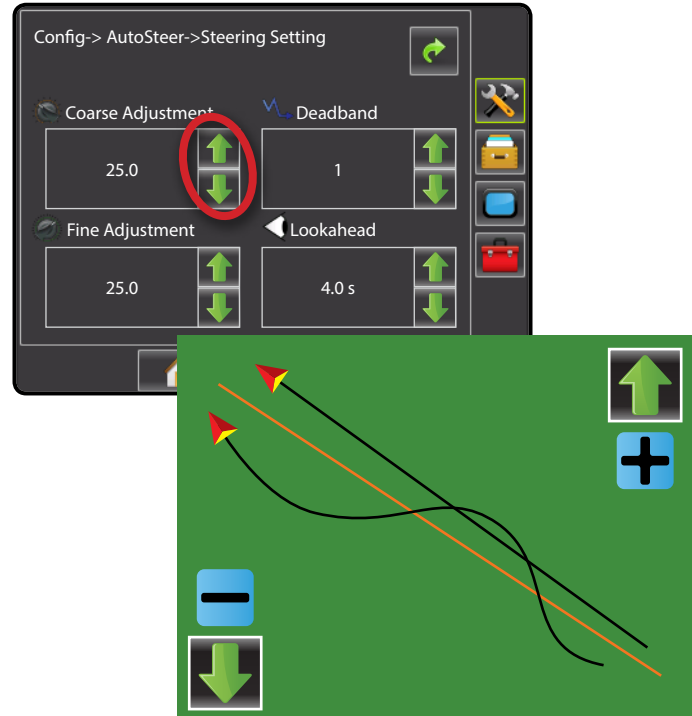


### Coarse Steering Adjustment

Coarse Adjustment adjusts how aggressively the vehicle maintains a guideline in Straight AB Guidance mode. Range is 0.0 - 100.0. Default is 25.0.

1. Press:
  - ▶ UP arrow if the vehicle is drifting away from the guideline or not approaching it fast enough.
  - ▶ DOWN arrow if the vehicle is oscillating rapidly or overshooting the guideline.

Figure 21: Coarse Steering Adjustment

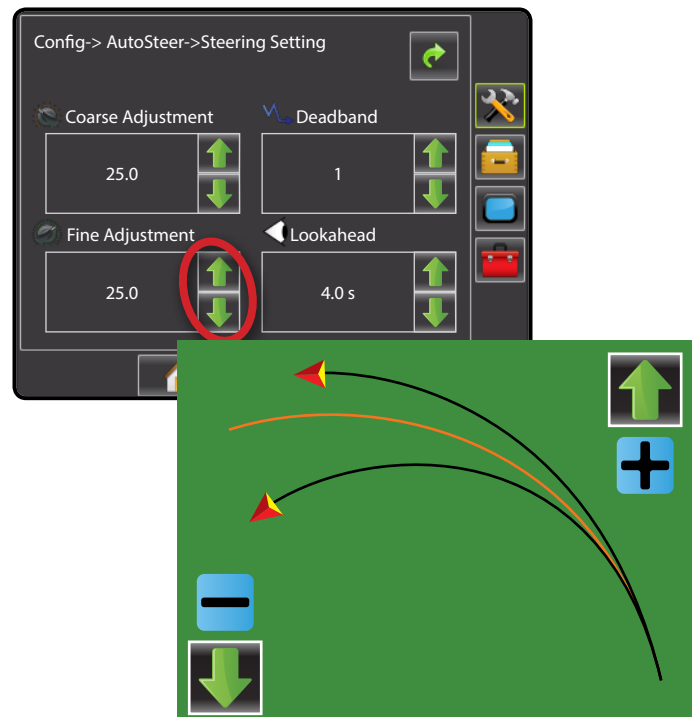


### Fine Steering Adjustment

Fine Adjustment adjusts how aggressively the vehicle maintains a guideline in Curved AB Guidance mode. Range is 0.0 - 100.0. Default is 25.0.

1. Press:
  - ▶ UP arrow if the vehicle drives outside of corners.
  - ▶ DOWN arrow if the vehicle cuts corners.

Figure 22: Fine Steering Adjustment



## Deadband

Deadband adjusts if steering is too choppy/responsive or remains consistently off the guideline. As the value is increased, stability will increase but so will steady state error. Range is 1 - 10. Default is 1.



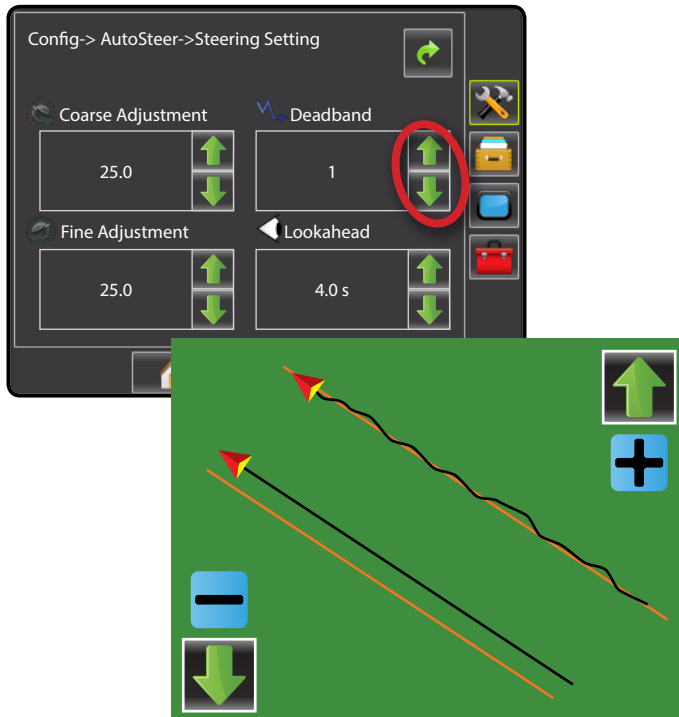
- Press:
  - ▶ UP arrow  if steering is too choppy or too responsive.
  - ▶ DOWN arrow  if the vehicle remains consistently off the guideline.

Figure 23: Deadband



## Lookahead

Lookahead used during Straight AB Guidance mode to adjust the vehicle's approach to the guideline. Fine tune the Lookahead by conducting several approaches to the guideline. Range is 0.0 - 10.0 seconds. Default is 4.0 seconds.



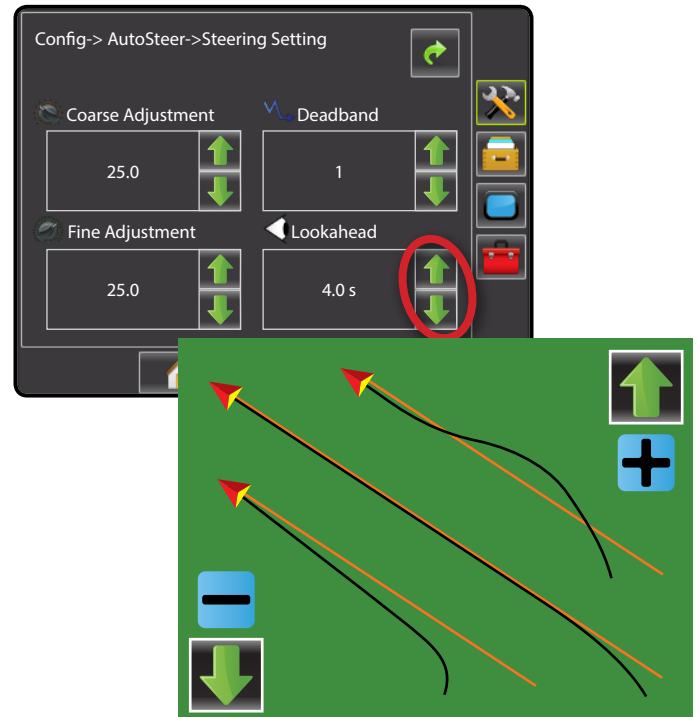
- Press:
  - ▶ UP arrow  if the vehicle is overshooting the guideline when approaching.
  - ▶ DOWN arrow  if the vehicle takes too long to get to the guideline.

Figure 24: Lookahead



# Assisted/Auto Steering

## Valve Test

The Valve Test verifies if steering is directed correctly. It can also be used to test the amount of time to steer the wheels from full left to full right (lock to lock) for non-proportional valves.

For non-proportional valves, the amount of time for left-to-right or right-to-left (lock to lock) will be established by mechanically adjusting oil flow through the valve.

For a UniPilot ESM, the amount of time for left-to-right or right-to-left (lock to lock) will be established by adjusting the Max Duty Cycle value.

For recommendations and factory settings for the FieldPilot or UniPilot setup values, see chart on page 19.

1. Select **Valve Test**.
2. While the vehicle is moving in a slow forward motion, turn the wheels all the way to the left.
3. Press RIGHT arrow →.
4. Press the engage/disengage switch or foot switch to activate the test. This will start a timer as well as turn the vehicle to the right.  
**WARNING!** When using a UniPilot, the UniPilot will move the steering wheel very quickly. Keep loose clothing, hair and hands away from the steering wheel while performing this test.
5. Press the engage/disengage switch or foot switch when the wheels are all the way to the right. The time displayed is the lock to lock time.
6. While the vehicle is moving in a slow forward motion, turn the wheels all the way to the right.
7. Press LEFT arrow ←.
8. Press the engage/disengage switch or foot switch to activate the test. This will start a timer as well as turn the vehicle to the left.  
**WARNING!** When using a UniPilot, the UniPilot will move the steering wheel very quickly. Keep loose clothing, hair and hands away from the steering wheel while performing this test.
9. Press the engage/disengage switch or foot switch when the wheels are all the way to the right. The time displayed is the lock to lock time.
10. Compare the lock-to-lock time with the recommended time.
11. Adjust the valve oil flow as needed and repeat test as needed.

Figure 25: Valve Test



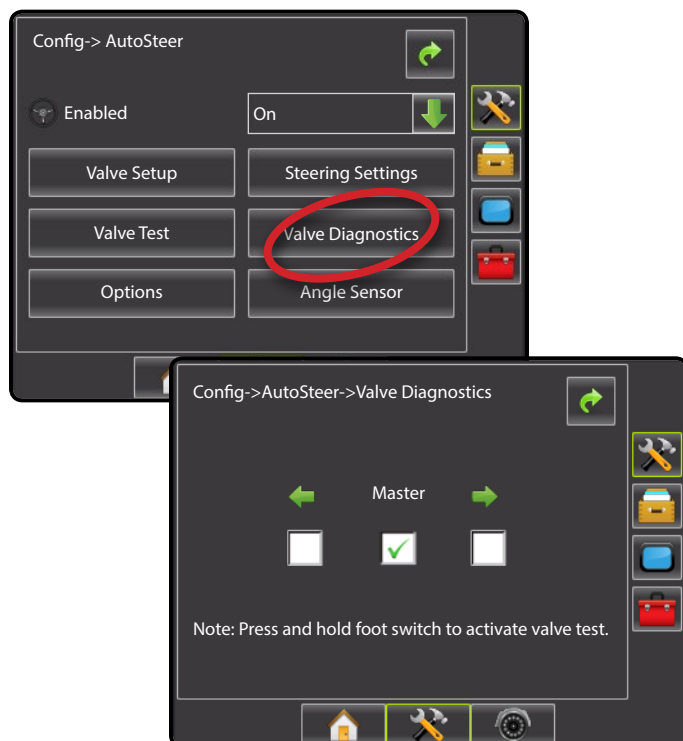
## Valve Diagnostics

The valve diagnostic test verifies if the valve is operating correctly.

This test is not necessary for UniPilot.

**NOTE:** The diagnostic tests do not require that the vehicle is in motion. A valid GPS signal is not required.

Figure 26: Valve Diagnostics



### Steering Valve – No Master Solenoid

1. Select **Valve Diagnostics**.
2. Activate the **Left** or **Right** check boxes associated with the valve direction to be tested.
3. Press and hold the engage/disengage switch or foot switch for one second.

*NOTE: Do not activate the **Master** check box.*

#### Test Reactions

Selected			Reaction	Issue
Left	Master	Right		
			None	Valve is operating correctly
			Wheels turn	Either the left valve or right valve is stuck open
•			Vehicle turns left	Valve is operating correctly
•			None	SCM, harness or valve malfunction
•			Vehicle turns right	Left and right connections to valve are reversed
		•	Vehicle turns right	Valve is operating correctly
		•	None	SCM, harness or valve malfunction
		•	Vehicle turns left	Left and right connections to valve are reversed

### Steering Valve – With Master Solenoid

1. Select **Valve Diagnostics**.
2. Activate the **Master** check box.
3. Activate the **Left** or **Right** check boxes associated with the valve direction to be tested.
4. Press and hold the engage/disengage switch or foot switch for one second.

#### Test Reactions

Selected			Reaction	Issue
Left	Master	Right		
	•		None	Valve is operating correctly
	•		Wheels turn	Either the left valve or right valve is stuck open
•			None	Valve is operating correctly
•			Wheels turn	Master valve is stuck open
		•	None	Valve is operating correctly
		•	Wheels turn	Master valve is stuck open
•	•		Vehicle turns left	Valve is operating correctly
•	•		Vehicle turns right	Left and right connections to valve are reversed
•	•		None	SCM, harness or valve malfunction
	•	•	Vehicle turns right	Valve is operating correctly
	•	•	Vehicle turns left	Left and right connections to valve are reversed
	•	•	None	SCM, harness or valve malfunction

# Assisted/Auto Steering

## Options: Steering Wheel Sensor

Steering wheel sensor selects whether the sensor used to automatically disengage FieldPilot when the steering wheel is turned is magnetic or pressure based. Check your specific configuration to determine if a Steering Wheel Switch Kit or a Pressure Switch is being used.

The UniPilot is not affected by this setting.


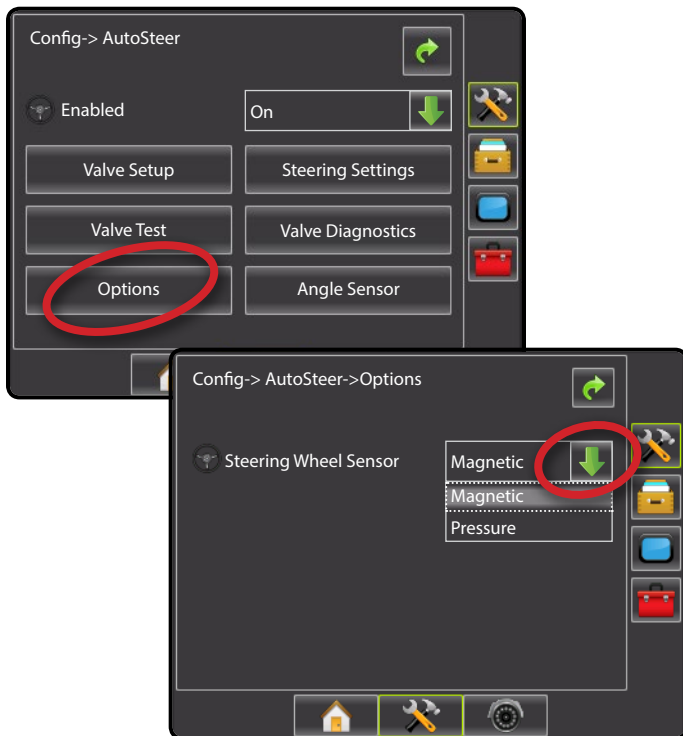
1. Select **Options**.
2. Press DOWN arrow  to access the list of options.
3. Select:
  - ▶ Magnetic
  - ▶ Pressure

Figure 27: Options: Steering Wheel Sensor



## Angle Sensor

Angle Sensor is used establish the Steering Angle Sensor (SAS) as the primary feedback sensor for auto steering, calibrate the SAS and set an offset adjustment.

1. Select **Angle Sensor**.
2. Select if the angle sensor is
  - ▶ Enabled
  - ▶ Disabled.
3. Select from:
  - ▶ Calibrate Sensor – sets the turn rate when steering the vehicle left and right.
  - ▶ Offset Adjustment – adjusts the path of travel to the established guideline.


Figure 28: Steering Angle Sensor





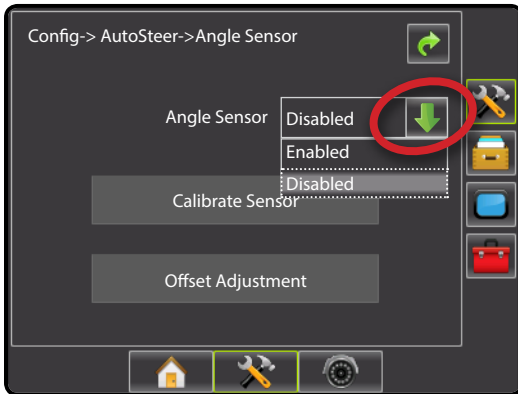
### Enable/Disable Angle Sensor

Set the use of a steering angle sensor to enabled or disabled.

1. Press DOWN arrow  to access the list of options.
2. Select:
  - ▶ Enabled
  - ▶ Disabled

If Angle Sensor is set to "Disabled", all Angle Sensor capabilities and setup functions will be disabled (options will be grayed out).

Figure 29: Enabled and Disabled Assisted/Auto Steering Options



### Calibrate Sensor

Calibrate Sensor sets the turn rate when steering the vehicle left and right.

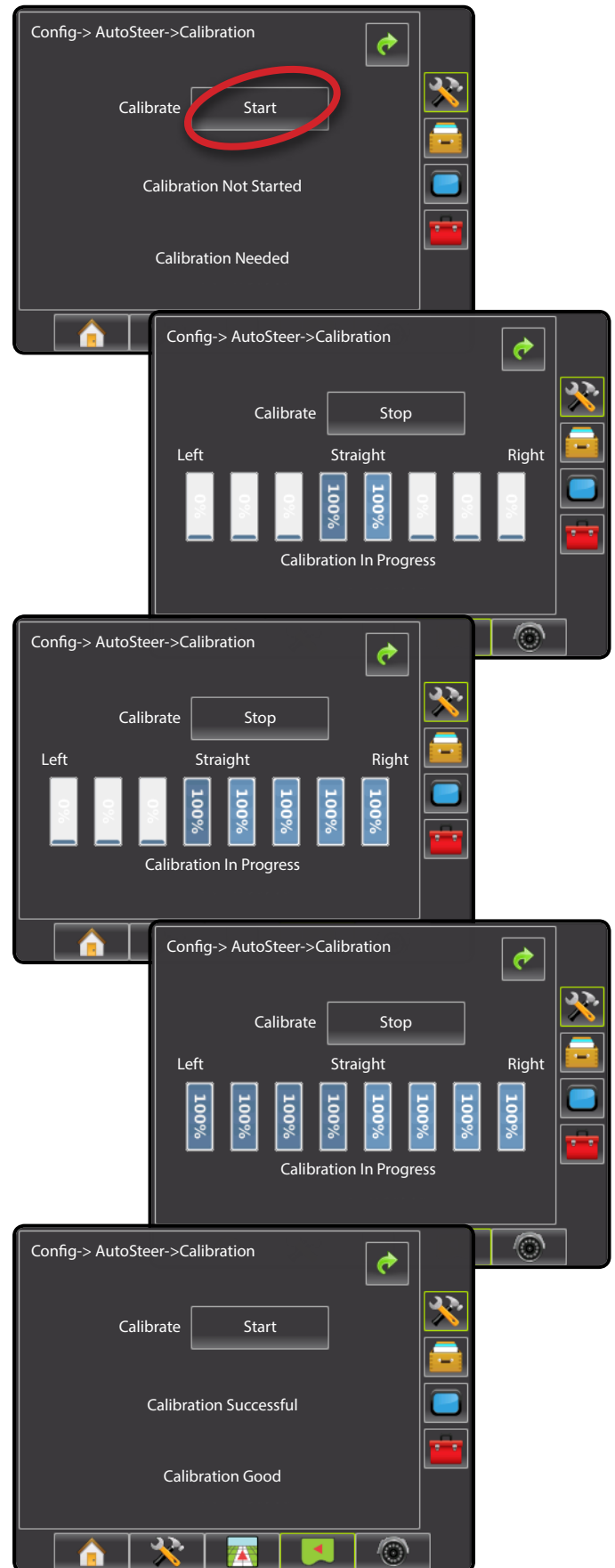
**NOTE:** A GPS signal is required for this test.

**RECOMMENDATION:** Have a large area of clear space available to perform test cycles. Vehicle speed must be between 1.0 mph and 8.0 mph / 1.5 - 13.0 km/hr (0.4 - 3.6 m/s).

1. Select **Calibrate Sensor**.
2. Slowly move the vehicle in a slow forward motion so the center two calibration boxes fill to 100%.
3. While still moving, slowly turn to the right or left until the appropriate right or left calibration boxes are filled to 100%.
4. While still moving, slowly turn in the opposite direction until the appropriate left or right calibration boxes are filled to 100%
5. "Calibration Successful" will appear when both left and right calibrations have been completed.

Press **Stop** to cancel the calibration.

Figure 30: Calibrate Sensor



# Assisted/Auto Steering

## Offset Adjustment

Offset Adjustment adjusts the path of travel to the established guideline.

*NOTE: A GPS signal is required for this test.*

*RECOMMENDATION: Have a large area of clear space available to perform a test cycle. Typical operating speed must be maintained for at least 30 seconds.*

1. Establish and/or activate a Straight AB guideline.
2. Select **Offset Adjustment**.
3. Engage assisted/auto steering guidance on established straight AB guideline.
4. While the vehicle is moving in a forward straight line motion at typical operating speed on the established guideline, press **Start**.
5. Allow the vehicle to drive using the Assisted/Auto Steering for 30 seconds
6. "Adjust Successful" will appear when adjustment has been completed.

Press **Stop** to cancel the adjustment.





Figure 31: Offset Adjustment



## Tilt

The Tilt function corrects the GPS signal to compensate for errors in the GPS position while operating on sloped terrain.

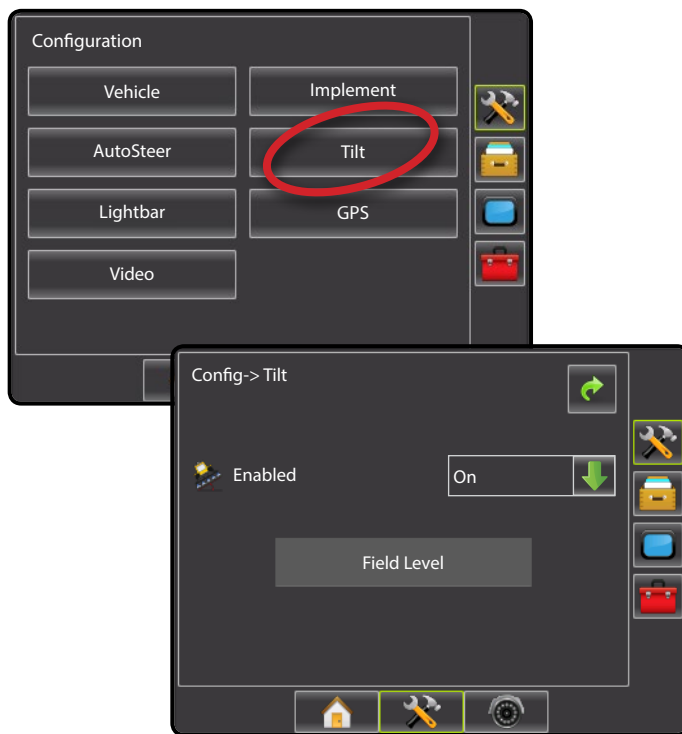
*NOTE: A mistake in the calibration process that results in a 1 degree error in the Tilt reading from the SCM/TGM will result in a 2.0 in. / 5.1 cm error in guidance [on a machine that has 9.5 ft. / 2.9 m antenna height]. This potential error necessitates that all reasonable care is taken to ensure that the system is installed and calibrated correctly in order to produce accurate Tilt measurement and machine guidance.*

1. Press CONFIGURATION side tab .
2. Press **Tilt**.
3. Select from:
  - ▶ Enabled  – used to set tilt correction to on or off
  - ▶ Field Level – used to calibrate tilt correction
4. Press RETURN arrow  or CONFIGURATION side tab  to return to the main Configuration screen.

*NOTE: If FieldPilot or UniPilot is being used, tilt correction is built into the SCM.*

*NOTE: Antenna Height must be entered prior to Tilt Calibration.*

Figure 32: Tilt




### Tilt Correction Unavailable

If a TGM or SCM is not connected or the vehicle is in motion, calibration option will not be available. Vehicle must be stopped for at least 10 seconds to begin to calibrate tilt correction.

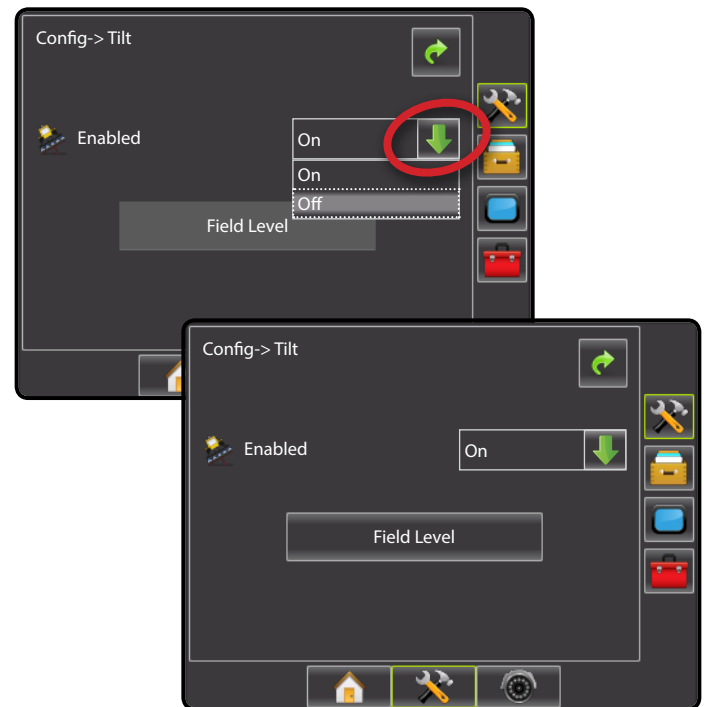
### Enable/Disable Tilt

Set Tilt option to on or off.

1. Press DOWN arrow  to access the list of options.
2. Select:
  - ▶ On
  - ▶ Off

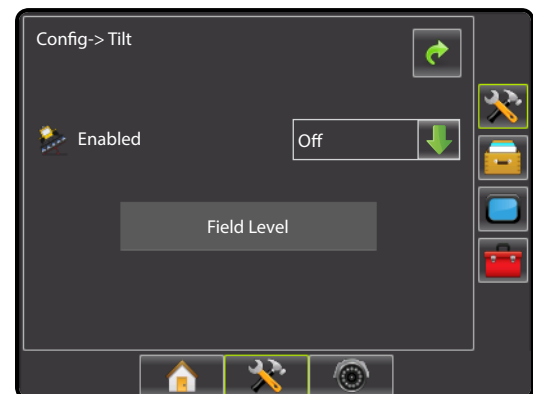
*NOTE: When tilt is enabled and the vehicle is in motion, **Field Level** will not be available. Vehicle must be stopped for at least 10 seconds to begin to calibrate tilt correction.*

Figure 33: Tilt On/Off



If Enabled is set to "Off", field leveling capabilities will be disabled (option will be grayed out).

Figure 34: Tilt Correction Off



# Assisted/Auto Steering

## Field Level

Field level will calibrate the SCM/TGM's level surface value.

Before performing Field Level:

- Use a quality GPS receiver/antenna
- Make sure the GPS antenna is mounted as per the manufacturer's installation instructions
- The SCM/TGM **must be securely mounted** to a surface that moves in parallel to the surface that the GPS antenna is mounted on. For example, if the antenna is mounted to the roof of the cab, the SCM/TGM should be mounted to another surface on the cab, not on the chassis.
- Mount the SCM/TGM on a horizontal surface with the connectors facing straight up and the arrow on the decal pointing in the primary direction of travel.
- Choose a calibration site that is as level as possible

To calibrate the SCM/TGM:

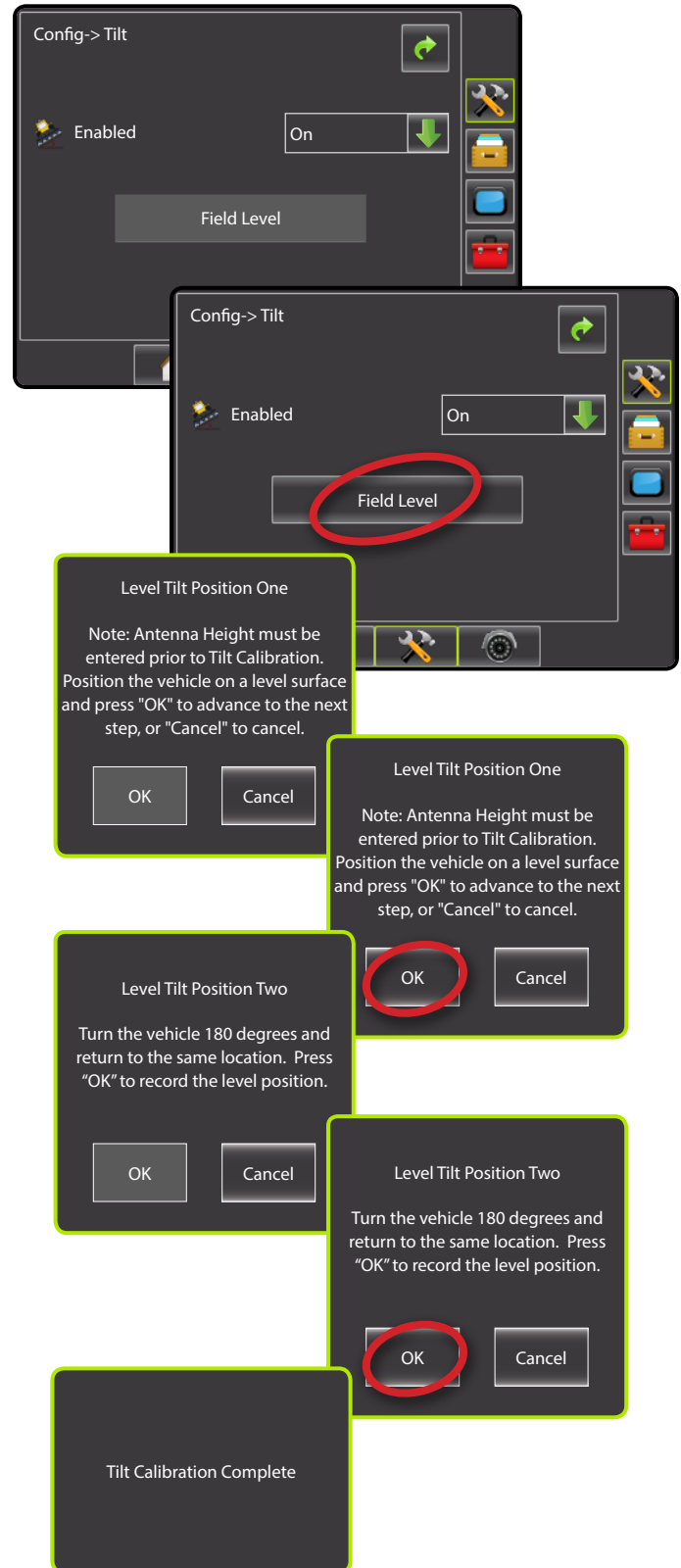
1. Position the vehicle on a level surface. Let vehicle sit/settle for at least 10 seconds.
2. Select **Field Level**.
3. Let vehicle sit/settle for at least 10 seconds.
4. Press **OK**.

**NOTE:** *Until vehicle has been stopped for at least 10 seconds, **OK** will not be available.*

5. Get out of the vehicle to mark on the ground the exact position of the vehicle (use paint, sticks, or something similar).
6. Turn the vehicle 180 degrees and reposition the vehicle in exactly the same location (the front wheels should now be where the back wheels were, and the back wheels should be where the front wheels were).
7. Let vehicle sit/settle for at least 10 seconds.
8. Press **OK**.

**NOTE:** *Until vehicle has been stopped for at least 10 seconds, **OK** will not be available.*

Figure 35: Field Level




## AUTO/ASSISTED STEERING OPERATION

### Assisted/Auto Steering Status




Assisted/Auto Steering Status displays information regarding the current status of the auto/assisted steering system.

1. Press AUTOSTEER STATUS icon    to view the auto/assisted steering status.

Figure 36: Assisted/Auto Steering Status



**Assisted/Auto Steering Status**

-  Green = Engaged, actively steering
-  Yellow = Enabled, all conditions have been met to allow for assisted/auto steering
-  Red = Disabled, all conditions have not been met to allow for assisted/auto steering.
- No icon = no assisted/auto steering system installed on system

## APPENDIX - FACTORY SETTINGS & RANGES

### AutoSteer Setup Settings

Description	Factory Setting	Range	FieldPilot Recommended Setting	UniPilot Recommended Setting	User Settings
AutoSteer	On				
Valve Type	Standard PWM		**	Standard PWM	
Valve Frequency	175 Hz	0.9 - 15000.1 Hz	**	100 Hz	
Minimum Duty Cycle Left	20.0%	0.0 - 50.0%	30.0%	30.0%	
Minimum Duty Cycle Right	20.0%	0.0 - 50.0%	30.0%	30.0%	
Maximum Duty Cycle	50%	25 - 100%	100%	100%	
Lock-to-Lock Time	0 seconds		**	5-6 seconds*	
Coarse Steering Adjustment	25.0	1.0-100.0	25	25	
Fine Steering Adjustment	25.0	1.0-100.0	25	25	
Deadband	1	1-10	1	1	
Lookahead	4.0	0.0-10.0	3.5	3.5	
Steering Wheel Sensor	Magnetic		N/A	N/A	
Angle Sensor	Disabled				

\*\* Specified in specific vehicle installation guide.

\* When traveling at speeds greater than 10 mph/16 kph, increase lock-to-lock time to 7-8 seconds.